**Investigating Trigonometric Functions**

**Daily Lesson Topic:** Basic Trigonometric Functions, Inverse Trigonometric Functions, Reciprocal Trigonometric Functions

**Unit:** Trigonometric Functions

**Standards:** HS-F-BF3, 4

3. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

4. Find inverse functions.

a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2 x3 or f(x) = (x+1)/(x–1) for x ≠ 1.

HS-F-TF5, 6, 7

5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★

6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.★

**Goals:** Students will know what each of the trigonometric functions look like and the properties of each.

**Daily Objectives:** Students will understand the different components of each trigonometric equation and what differences exist between them.

**Instructional strategy:** Discovery lesson with Geometer’s Sketchpad.

**Modification/accommodation:**

**Materials:** computers with Geometer’s Sketchpad, [Investigating Trig-GSP](file:///C:\Users\TiffanyDavis\Documents\Tech.%20for%20Ed\Investigating%20Trig-GSP.zip) (This folder contains 3 worksheets and a GSP file for the students to use. Because of the amount of information to be discovered, this lesson might take more than one class period.)

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| Time:  2 min. | **Introduction:**  I will start signing the alphabet, asking the question: “What are these?” The correct answer should be signs. Then, I will ask a volunteer to come to the front, and we will sign together. I will ask the class, “What is this person doing?” Hint: He/she is signing with me. The correct answer would be cosigning. “And when you put sine over cosine, what do you get?” Tangent!  Today, we are going to be looking at all three of these functions, their graphs, and different properties each one has. | |
| Time:  45 min. | **Instruction:**  This is a discovery lesson. No formal instruction will be provided unless confusion arises. | Students should have some background with graphs, specifically with the terms domain, range, amplitude, period, vertical shifts, and phase shifts, unless you desire them to discover those as well. |
| Time: | **Practice:**  Students will be practicing concepts with the attached worksheets as they discover them. |  |
| Time: | **Assessment**:  Assessment is also part of the worksheets. They will be handed in for a grade and to check understanding. |  |
| Time:  3 min. | **Closure/Wrap Up:**  Make sure that students do not have any questions about what they found. | Talk about real world examples that are measured by these functions; some are mentioned on the worksheets. |
|  | **Reflection:**  I see a problem in the amount of time that this might take some students. Ideally, this would take only one class period, but students will play with the technology, which is a very good thing and is encouraged. Therefore, this lesson could take up to three class periods, based on the three worksheets and giving students enough time to investigate fully what each function does and looks like. | |